DOCUMENT RESUME

ED 329 249 IR 014 914

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TITLE Spreading the Benefits of Audiographics Distance Learning. A Final Report.
INSTITUTION Far West Lab. for Educational Research and Development, San Francisco, Calif.
PUB DATE Sep 90
NOTE 20p.
PUB TYPE Reports - Descriptive (141) -- Reports - Evaluative/Feasibility (142)

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS Audiovisual Aids; Computer Graphics; *Computer Networks; *Distance Education; Facsimile Transmission; Guides; High Schools; *Information Dissemination; *Pilot Projects; Program Implementation; *Rural Schools; State Departments of Education; Technical Assistance; *Telephone Communications Systems
IDENTIFIERS *Audiographics; Utah

ABSTRACT

The audiographics distance learning system (ADL) was piloted by Far West Laboratory (FWL) in 1987-1989 at four school districts in the Great Basin region of Utah. This project was designed to: (1) further develop ADL planning materials for rural schools; (2) disseminate information about ADL to regional and national audiences; and (3) provide ADL assistance to rural schools and agencies. Audiographics distance learning is a system that uses the telephone, computer networking, and telefax transfer of materials to connect students in one or more secondary schools with a teacher in another school, creating interactive classroom instruction. Students and teachers communicate through audio as well as computer graphics modes. For the duration of the project, FWL staff, in coordination with the Utah State Department of Education, demonstrated the system with live hook-ups at seven regional and national conferences. In addition, FWL staff consulted with over a dozen rural agencies interested in ADL and evaluated their response to the presentations. This report, which covers activities from October 1, 1989 through September 30, 1990, provides an overview of the project which covers the need for such programs, the technology and how it is used, the pilot tests, and the development of a multimedia implementation resource unit for use by rural schools in planning and implementing an audiographics system. Results of evaluations of the Audiographics Handbook and ADL demonstrations and presentations are provided, as well as a list of agencies and institutions that sought counsel/technical assistance from FWL staff. The review form for the handbook is appended. (DB)

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SPREADING THE BENEFITS OF AUDIOGRAPHICS DISTANCE LEARNING

A Final Report

September 1990

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Spreading the Benefits of Audiographics Distance Learning

A Final Report

September
1990

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Abstract

This is the final report on the project to Spread the Benefits of Audiographics Distance Learning Technology (October 1, 1989 - September 30, 1990).

The audiographics distance learning system (ADL) was piloted by Far West Laboratory in 1987-1989 at four school districts in the Great Basin region of Utah. This project is designed for: 1) further develop ADL planning materials for rural schools 2) disseminate information about ADL to regional and national audiences, and 3) provide ADL assistance to rural schools and agencies.

For the duration of the project, FWL staff demonstrated the system with live hook-ups at seven regional and national conferences. In addition FWL consulted with over a dozen rural agencies interested in ADL. The final product, a planning and implementation resource unit, has been completed.

Spreading the Benefits of Audiographics Distance Learning Technology

Introduction

In the west, as in the other regions of the country, small, rural schools are unable to attract enough qualified teachers in specialized areas, such as special education or advanced placement classes. Often, they don't have enough students to justify subject-certified teachers even for the basic required courses.

Teaching multiple grades and multiple subjects is just a facet of life for the rural teacher. In 26 of Nevada's remote schools, for example, some of them as far as 350 miles from a central administrative office, one to three teachers are responsible for instruction in 8 grades, and 21 of these are one-teacher schools. Similarly, one third or more of the faculty in Utah's 25 smallest schools teach subjects for which they are not academically prepared. These problems of teacher shortages and insufficient resources, while not new to small, rural schools, are now exacerbated by growing demands for better performance and access to broader, more rigorous curricula.

One promising answer to these special challenges lies in innovative approaches to distance learning, approaches that permit school districts to better distribute their instructional resources without having to relocate staff.

To some, the term distance learning may still call up old images of educational television: students packed around a TV screen, while "talking faces" dispensed information. Or it may prompt memories of correspondence classes with their obscure method of routine assignments and anonymous graders. But with the recent development of more sophisticated technologies, distance learning is taking new interactive forms that let teachers hear as well as speak to students in remote locations.

Educators in the western region and other parts of the country are discovering that when properly designed and implemented, live two-way instruction across long distances can expand curriculum, stretch budgets, and broaden student horizons, improving both teaching quality and student performance. One of the most effective of these interactive systems, and by far the most economical, is audiographics.

A Promising Practice: Enhancing Curriculum Through Audiographics

Audiographics distance learning (ADL) combines use of the telephone, computer networking, and telefax transfer of materials to connect students in one or more schools with a teacher in another to create, real-time, interactive classroom instruction. In addition to speaking to the receiving classes, the instructor can use a digitized drawing pad and keyboard to "draw" on a computer screen. The image, or graphic, immediately appears on students' screens at the remote sites. Students, in turn, use their own drawing pad and keyboards, as well as a speaker and phone to interact with the teacher. Although teachers and students do not see one another, they can communicate through audio as well as graphic modes.

Specially designed software is used to create the visuals—words, graphics, and pictures—that appear on the remote screens. Visual aids can be prepared by the teleteacher before class, stored on disk and called up as needed, or can be created as the lesson progresses. Adding a facsimile machine provides rapid transmission of paper "hard copies" of tests, handouts, and other materials.

In 1987 students in an isolated, rural school in Utah were badly in need of an expanded curriculum to meet state graduation standards. The superintendent of Tintic School District felt that the solution was a distance learning program using teachers from a larger high school to teach students at this small, isolated school; he subsequently sought help from Far West Laboratory (FWL). We agreed to provide this assistance—which gave us the opportunity to develop a pilot model—and the Utah State Department of Education (USOE) agreed to provide technical assistance and funding to the effort while it was in the process of developing a state technology initiative.

USOE suggested that students in the remote desert areas of Box Elder, Tooele, Tintic and Millard, four contiguous school districts with similar needs and problems, become the focus of a collaborative distance learning effort. The Great Basin Distance Learning Project was formed to: 1) provide students attending schools in the Great Basin area of Utah with courses needed for high school graduation and college entrance; and 2) demonstrate and expand the usefulness of distance learning technology.

In 1987, the first year of the project, teleteaching sites were created in six schools in the region: Box Elder, Bear River, Delta, Millard, Tintic and West Desert. Equipment was procured and telephone lines were installed, tested and "debugged."

Initially the project schools were skeptical about using a system that did not include live video. However this capability was not initially affordable, and at the conclusion of the second year of use, the consensus was that audio and not video was still the only feasible approach for the small remote schools in Utah's western desert.

After preservice training, the six project schools began their fall 1988-89 curriculum offering with four audiographic telecourses: French, advanced math, English, and principles of technology. At the semester break, two more schools, Park Valley and Grouse Creek (K-10), and a biology course were added to the curriculum. Plans for 1990, the third year of the project, include increasing course offerings and linking several new schools from the state of Nevada to the project, thus creating a two-state distance learning cooperative.

Districts in the Great Basin project have made further advancements in the audiographic system, transmitting data and voice communication using just one telephone line. A multiplexing modem splits the frequencies, using part of the band for audio and part for data. This innovation significantly reduces operational costs of the system over long distances.

A formative evaluation conducted by FWL in 1989 showed the following: 1) the majority of teleteachers, learning facilitators and students agreed that the distance learning classes were as interesting as other classes, 2) learning occurred at a comparable rate with traditional delivery, 3) there were no more problems in these classes than in traditional classes, and 4) they wanted to see curriculum expanded using this technology.

Students also reported these benefits:

- "I think that learning with a computer is fun and interesting 'cause you can say a lot more with pictures than just words."

- "We learn a lot from this class by working with other schools because . . . you can get different opinions and ideas from other people from other schools."

- "A lot of homework, but I'll probably be better for it. It's better than any other English that I've taken."

Collective experience to date confirms the claims of the system's developers and proponents: the audiographics system is a cost effective way for rural schools to supplement their curricula with needed instruction. Equipment costs are well within the financial reaches of most rural schools; both the hardware and the software package are relatively simple to operate; schools themselves can program what is to be transmitted to remote sites; and students at the remote site are receiving required courses they normally would not receive. In short, the audiographic system is a highly promising practice that can enable rural, small schools to provide quality educational programs when resources and trained personnel are not available.

Spreading the Benefits of Audiographics Distance Learning Technology

To help spread the benefits of this approach to schools in our region and nationally, FWL proposed a series of dissemination activities to OERI in 1989. The overall objective of the proposed plan was to help rural schools become more aware of the potential of the audiographic system for enhancing instruction and to assist rural schools in planning to use the system. The work to be performed included three tasks: 1) development of a comprehensive Implementation Resource Unit outlining instructional applications of audiographics systems; 2) dissemination of information about audiographic distance learning at regional and national conferences; and 3) direct planning assistance to help rural schools use the audiographics system.

Task 1. Development of a Multi-media Implementation Resource Unit

The Implementation Resource Unit is designed to provide all the information necessary for rural schools to begin the process of planning and implementing an audiographics system. It consists of the following printed as well as audiovisual components.

- A nine-minute video entitled "Overview of the Audiographic Distance Learning System," with footage demonstrating instructional applications in both sending and receiving classrooms.

- A printed guide to planning and implementing an audiographics distance learning system. The guide consists of an overview of ADL, chapters on how to select equipment, plan instrumental programs and sample lessons, and teaching strategies. An appendix includes information about vendors, and a list of sites where ADL is being implemented.

During the months of September and October 1989, a presentation format was developed. The program included an introduction to distance learning, the "Overview" videotape explaining audiographics distance learning, a live demonstration of the audiographics teleteaching involving the conference attenders, a question and answer period, a summary and the distribution of appropriate literature.

In October and November a script was written and footage was shot for the audiographics video. FWL contracted with production houses in Pennsylvania, Canada, Utah and South Dakota and edited hours of video footage down to a nine minute tape on audiographics distance learning.

The tape was then used as part of the FWL dissemination presentations at seven regional and national educational conferences. Conference attendees were asked, "Did the videotape help you understand the audiographics distance learning technology?" Mean ratings (on a Likert Scale of 1-5 with 5 representing "Very Well") ranged from 3.7 to 4.7. These ratings indicated that the tape was well received.

Content changes as well as improvements in technical quality were made in August 1990.

The printed guide, *Audiographics Distance Learning: A Resource Handbook*, was sent out to nine reviewers from the region: two from Arizona, Nevada, and Utah and three from California. The reviewers were all educators, representing school districts, state offices, universities, and a service center. They included teachers, administrators, and educational technologists.

Accompanying each handbook was a review form (see Appendix A). Eight review forms were returned. Results of the review are as follows:

Table 1

Reviewer Ratings of the Audiographics Handbook

(1=strongly disagree; 5=strongly agree)

Statement		Mean Rating
1.	The format or lay-out is attractive and easy to follow.	4.0
2.	The content is well organized.	4.4
3.	Terms that describe technology and its applications are clearly defined in the text or in Appendix A.	4.4
4.	The differences between audiographics distance learning and one-way TV or two-way TV are clear.	4.4
5.	The descriptions of the four audiographics distance learning systems are understandable. (Chapter III)	4.1
6.	The procurement and installation procedures are clearly described.	4.4
7.	The Guidebook provides a useful procedure for organizing instructional applications for audiographics. (Chapter V)	4.9
8.	The teaching strategies and sample lesson materials are helpful. (Chapter VI)	3.9
9.	The appendices contain useful sources for additional information.	4.4
10.	Overall, the handbook is a valuable tool for those interested in planning and implementing an audiographics distance learning system.	4.9

Suggestions and comments were made by the reviewers. As a result, further revisions of the handbook were made.

The final form of the Resource Handbook as well as the videotape have been completed. Copies are being sent to OERI as contractual deliverables.

Task 2. Dissemination of Audiographic Distance Learning

We targeted administrator and school board conferences for dissemination because their participants are the decisionmakers for adoption of audiographics distance learning systems. These dissemination activities included demonstrations of an audiographic system at both national and state conferences.

Proposals for presentations were sent to four national educational groups—National School Boards Association (NSBA), American Association of School Administrators (AASA), National Association of Secondary School Principals (NASSP), and Association for Educational Communications and Technology (AECT). As a result of the project start date, the NSBA was the only organization that could accommodate us for their upcoming spring conference. The other spring conference programs were full as early as nine months in advance.

However, FWL did arrange for ADL demonstrations at the following six state conferences:

Arizona School Boards Associations	Phoenix, AZ	12/13/89
Utah Schools Boards Association	Salt Lake City, UT	1/13/90
Utah School Superintendents	Salt Lake City, UT	4/2/90
Nevada School Boards Association	Las Vegas, NV	4/6/90
Arizona School Administrators	Scottsdale, AZ	5/7/90
Computer Using Educators	Palm Springs, CA	5/12/90

Throughout November and early December 1989, FWL staff worked with two teachers from Utah schools to plan two live telelearning demonstrations at scheduled conferences. Visuals were prepared that would illustrate the capability of the technology.

Evaluation

FWL staff made its national presentation on audiographics distance learning at the National School Boards Association Convention in New Orleans, Louisiana, April 21, 1990. FWL's demonstration at the convention was a part of the special ITTE Technology Leadership Network Meeting. Approximately 130 school board members, technology specialists and administrators were in attendance. The presentation included: 1) the introduction of the Great Basin Distance Learning Project by a local Box Elder School District, Utah, board member; 2) a interactive biology mini-lesson taught live from Brigham City, Utah, by a Box Elder school teacher; and 3) the opportunity to ask students present taking an audiographics distance learning class how they felt about it. It was obvious that viewers were intrigued with the possibilities of ADL and gained insight into what rural districts can accomplish.

FWL evaluation forms were placed on every other seat prior to the beginning of the session. Attendees were asked to fill them out after the presentation and leave them on their seats. Of approximately 130 forms, 41 were filled out. As shown in the chart below, attenders responded to each of the questions using a Likert Scale gradation of five, with five representing "Very Well" and one "Not Well." Results of the participant evaluation are as follows:

Table 2

Participant Evaluation of FWL demonstration at
NSBA, ITTE Technology Network Meeting
New Orleans, Louisiana, April 21, 1990
(N=41)

Question	Mean Rating
1. Did the presentation improve your understanding of audiographics distance learning technology?	4.4
2. Did the video tape help you understand the audiographics distance learning technology?	4.3
3. Did the lesson demonstration help you understand the audiographics distance learning technology?	4.4
4. Were questions that you had about audiographics distance learning delivery answered during the question period?	3.9
5. Were the presenters prepared, knowledgeable and responsive to the group?	4.6
6. Audiographics distance learning hold promise as a means of meeting students' instructional needs. (Strongly agree - Strongly disagree)	4.3

In addition to this national presentation, FWL staff made an additional six presentations at state-sponsored conferences in the region. The format of the presentation was identical to the NSBA presentation, i.e. it included live demonstrations of ADL with distant schools in Utah. The following participant evaluations indicated again that the presentations were very well received:

Table 3

Participant Evaluations of Six FWL Demonstrations at State Educational Conferences

Chart shows Likert Scale ratings for each evaluation question by each of the group of viewers (organizations). The organizations are repeated below the chart for easy reference.

Question #	ASBA N=40	USBA N=50	USSA N=7	NSBA N=47	ASA N=9	CUES N=12
1. Did the presentation improve your understanding of the audiographics distance learning technology?	4.1	4.5	4.3	4.2	4.4	4.8
2. Did the video tape help you understand the audiographics distance learning technology?	3.9	4.0	4.7	3.8	4.2	4.5
3. Did the lesson demonstration help you understand the audiographics distance learning technology?	3.9	3.7	4.7	4.0	4.4	4.5
4. Were questions answered that you had about audiographics distance learning delivery during the question-answer period?	3.7	4.3	4.2	4.2	4.4	4.8
5. Were presenters prepared, knowledgeable and responsive to the group?	4.0	4.5	4.8	4.6	4.6	4.9
6. Audiographics distance learning holds promise as a means of meeting students' instructional needs. (Strongly agree - Strongly disagree)	4.2	4.4	4.7	4.4	4.4	4.7

ASBA: Arizona School Boards Association
USBA: Utah School Boards Association
USSA: Utah School SuperintendentsAssociation
NSBA: Nevada School Boards Association
ASA: Arizona School Administrators
CUES: Computer Using Educators

Task 3. Direct Planning and Assistance

Following each presentation FWL staff usually spent as much as an hour, and often more, answering question from interested educators. Most of these requested further materials and many wanted to explore the feasibility of ADL applications in their situation. The following is a list of agencies and institutions that sought counsel/technical assistance from FWL staff:

Universities

California State Polytechnical University, Pamona
University of California, Riverside
California State University, Fresno
California State University, Bakersfied
Kansas State University
Brigham Young University, Hawaii Campus
Washington State University, Pullman

School Districts

Edison School District, CO
Austin Independent School District, TX
Lyon County School District, NV
Elko County School District, NV
Morgan School District
Sevier School District, UT
San Bernardino County Schools, CA
Sonoma County Schools, CA
Elk Point School District, SD
Marin County Office of Education, CA

Other Agencies

Riverview Intermediate Unit, PA
U.S. Agency for International development, D.C.

Appendix A

Review Form for
Audiographics Distance Learning: A Resource Handbook

A Review of
Audiographics Distance Learning: A Guidebook for Educators

Directions:

After reading the enclosed draft document, "Audiographics Distance Learning: A Guidebook for Educators," please respond to the following questions. Circle the number that indicates your agreement with the statement, then add any comments or suggestions for improvement. Keep in mind that the final product will include visual illustrations. Please return to Far West Laboratory for Educational Research and Development, 1855 Folsom St., San Francisco, CA 94103, Attn: Dean Bradshaw.

1. The format or lay-out is attractive and easy to follow.

Strongly agree	Agree	Neither agree or disagree	Disagree	Strongly disagree
5	4	3	2	1

Comments and Suggestions:

2. The content is well organized.

Strongly agree	Agree	Neither agree or disagree	Disagree	Strongly disagree
5	4	3	2	1

Comments and Suggestions:

3. **Terms that describe technology and its applications are clearly defined in the text or in Appendix A.**

Strongly agree	Agree	Neither agree or disagree	Disagree	Strongly disagree
5	4	3	2	1

Comments and Suggestions:

4. **The differences between audiographics distance learning and one-way TV or two-way TV are clear. (Chapter II)**

Strongly agree	Agree	Neither agree or disagree	Disagree	Strongly disagree
5	4	3	2	1

Comments and Suggestions:

5. **The descriptions of the four audiographics distance learning systems are understandable. (Chapter III)**

Strongly agree	Agree	Neither agree or disagree	Disagree	Strongly disagree
5	4	3	2	1

Comments and Suggestions:

6. The procurement and installation procedures are clearly described. (Chapter IV)

Strongly agree	Agree	Neither agree or disagree	Disagree	Strongly disagree
5	4	3	2	1

Comments and Suggestions:

7. The guidebook provides a useful procedure for organizing instructional applications for audiographics. (Chapter V)

Strongly agree	Agree	Neither agree or disagree	Disagree	Strongly disagree
5	4	3	2	1

Comments and Suggestions:

8. The teaching strategies and sample lesson materials are helpful. (Chapter VI)

Strongly agree	Agree	Neither agree or disagree	Disagree	Strongly disagree
5	4	3	2	1

Comments and Suggestions:

9. The appendices contain useful sources for additional information.

Strongly agree	Agree	Neither agree or disagree	Disagree	Strongly disagree
5	4	3	2	1

Comments and Suggestions:

10. Overall, the Guide is a valuable tool for those interested in planning and implementing an audiographics distance learning system.

Strongly agree	Agree	Neither agree or disagree	Disagree	Strongly disagree
5	4	3	2	1

Comments and Suggestions:

11. Please list colleagues who might be interested in receiving information about this guidebook when it is completed in October.

Name	Title/Position	Organization/Address	Phone No.